WHAT IS CLAIMED IS:

1. A semiconductor device comprising a circuit substrate, a semiconductor element, and a bump made of a solder alloy through which said semiconductor element is bonded onto said circuit substrate,

said solder alloy being an Sn-Ag-based alloy having its Sn content of 90 (wt%) or more and its Ag content within the range of 1.5 (wt%) to 2.8 (wt%), the amount of α rays in Sn being 0.01 (cph/cm^2) or less.

2. The device according to claim 1, wherein said semiconductor element is connected to said circuit substrate through 1,000 or more terminals each of which is made of a bump.

3. The device according to claim 1, wherein said solder alloy contains at least one of Cu, Zn, In, Sb, and Bi as an additive ingredient.

4. A circuit substrate comprising semiconductor elements bonded thereon through bumps made of a solder alloy,

said solder alloy being an Sn-Ag-based alloy having its Sn content of 90 (wt%) or more and its Ag content within the range of 1.5 (wt%) to 2.8 (wt%), the amount of α rays in Sn being 0.01 (cph/cm^2) or less.

5. The substrate according to claim 4, wherein each of said semiconductor elements is connected to

said circuit substrate through 1,000 or more terminals each of which is made of a bump.

6. The substrate according to claim 4, wherein said solder alloy contains at least one of Cu, Zn, In, Sb, and Bi as an additive ingredient.

7. A manufacturing method of a semiconductor device, said method comprising the step of bonding a semiconductor element onto a circuit substrate through a bump made of a solder alloy,

said solder alloy being an Sn-Ag-based alloy having its Sn content of 90 (wt%) or more and its Ag content within the range of 1.5 (wt%) to 2.8 (wt%), the amount of α rays in Sn being 0.01 (cph/cm^2) or less.

8. The method according to claim 7, wherein said semiconductor element is connected to said circuit substrate through 1,000 or more terminals each of which is made of a bump.

9. The method according to claim 7, wherein said solder alloy contains at least one of Cu, Zn, In, Sb, and Bi as an additive ingredient.

10. A manufacturing method of a semiconductor device, said method comprising the steps of:

forming electrodes on a circuit substrate;

forming grooves in a surface of a plate so as respectively to correspond to said electrodes;

filling each of said grooves with a solder alloy that is an Sn-Ag-based alloy having its Sn content of

90 (wt%) or more and its Ag content within the range of 1.5 (wt%) to 2.8 (wt%), the amount of α rays in Sn being 0.01 (cph/cm^2) or less;

heating said plate to a predetermined temperature more than the melting point of said solder alloy, to form solder balls made of said solder alloy;

putting said plate on said circuit substrate such that said solder balls respectively correspond to said electrodes on said circuit substrate, and thereby transferring each of said solder balls onto the corresponding one of said electrodes; and

removing said plate.

11. The method according to claim 10, further comprising the step of connecting a semiconductor element to said circuit substrate through 1,000 or more terminals each of which is made of a solder ball.

12. The method according to claim 10, wherein said solder alloy contains at least one of Cu, Zn, In, Sb, and Bi as an additive ingredient.

13. An Sn-Ag-based solder alloy having its Sn content of 90 (wt%) or more and its Ag content within the range of 1.5 (wt%) to 2.8 (wt%), the amount of α rays in Sn being 0.01 (cph/cm^2) or less.

14. The alloy according to claim 13, containing at least one of Cu, Zn, In, Sb, and Bi as an additive ingredient.

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